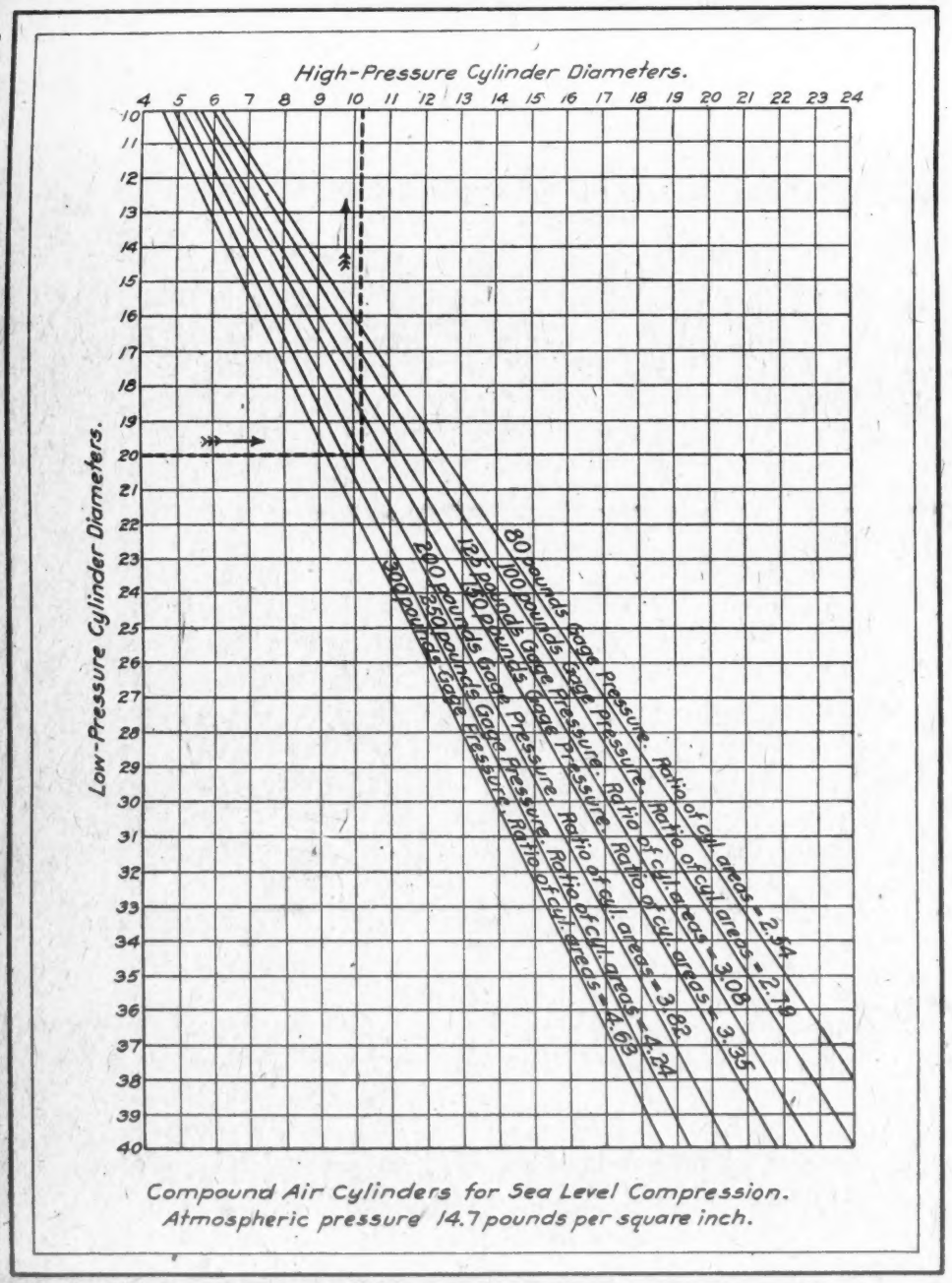
Contributed by J. William Jones


High-Pressure Cylinder Diameters.
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Low-Pressure Cylinder Diameters.
80 Pounds Gage Pressure. Ratio of cyl. areas = 2.94
100 Pounds Gage Pressure. Ratio of cyl. areas = 2.19
125 Pounds Gage Pressure. Ratio of cyl. areas = 3.08
150 Pounds Gage Pressure. Ratio of cyl. areas = 3.35
200 Pounds Gage Pressure. Ratio of cyl. areas = 3.82
250 Pounds Gage Pressure. Ratio of cyl. areas = 4.24
300 Pounds Gage Pressure. Ratio of cyl. areas = 4.63

Compound Air Cylinders for Sea Level Compression.
Atmospheric pressure 14.7 pounds per square inch.

Contributed by J. William Jones

Method of Using the Accompanying Charts.

The diameters of high-pressure cylinders for compound air compressors are found instantly from the accompanying charts for varying pressures and altitudes, when the low-pressure cylinder diameter and the stroke have first been computed with reference to the required piston displacement. The dotted lines and arrows in the diagrams indicate the procedure when the diameter of the low-pressure cylinder is 20 inches and the air compressed to 200 pounds gage pressure. The ratio between the cylinder diameters so found divides the load equally between the two stages, provided the intercooler abstracts all the heat due to compression in the first stage.

The ratios of cylinder areas in the charts are obtained from the absolute ratio of compression.

Example: Compression of 150 pounds gage pressure required.

Absolute pressure = 150 + 14.7 = 164.7 pounds.

Absolute ratio of compression = 164.7 ÷ 14.7 = 11.2.

The square root of this ratio is the ratio of the low-pressure piston area to the high-pressure piston area, or

$$\sqrt{11.2} = 3.35 = \text{ratio of cylinder areas.}$$

A table of absolute ratios of compression for various pressures and altitudes is given below:

Table of Absolute Ratios of Compression.

Gage Pressure, Pounds	Absolute Ratio of Compression.		
	Sea Level	5000 feet	10000 feet
80	6.44	7.55	8.92
100	7.80	9.20	10.90
125	9.50	11.25	13.40
150	11.20	13.30	15.90
200	14.60	17.40	20.80
250	18.00	21.50	25.80
300	21.40	25.60	30.70

The general formula for determining the high-pressure cylinder diameter is:

$$d = \sqrt{\frac{D^2}{\frac{P_1 + P_2}{P_1}}}$$

in which d = diameter of high-pressure cylinder,

D = diameter of low-pressure cylinder,

P_1 = initial pressure,

P_2 = terminal gage pressure.

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Supplement to MACHINERY, Augu
Diagrams for Article in this number entitled "High-Pressure Cylinder Diameter

HIGH-PRESSURE CYLINDER DIAMETERS FOR AIR COMPRESSORS—III

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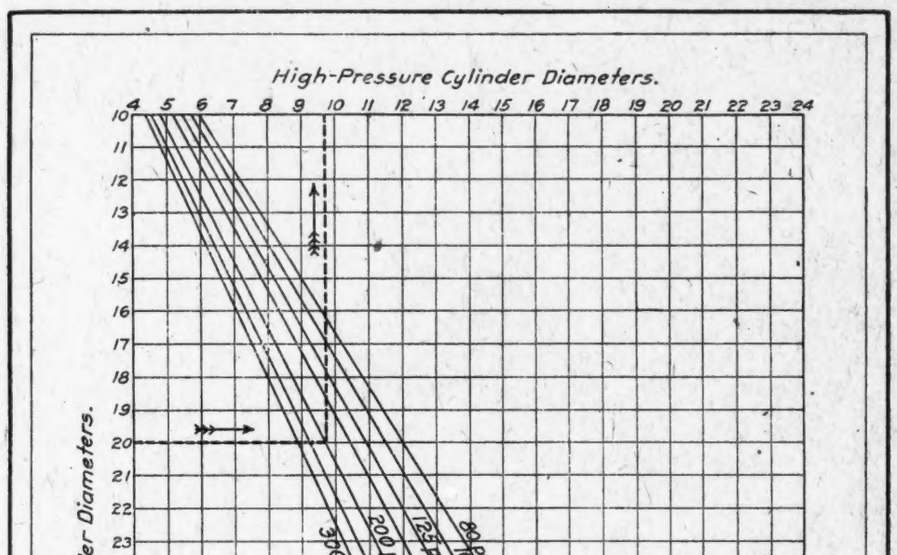

HIGH-PRESSURE CYLINDER DIAMETERS FOR AIR COMPRESSORS—IV

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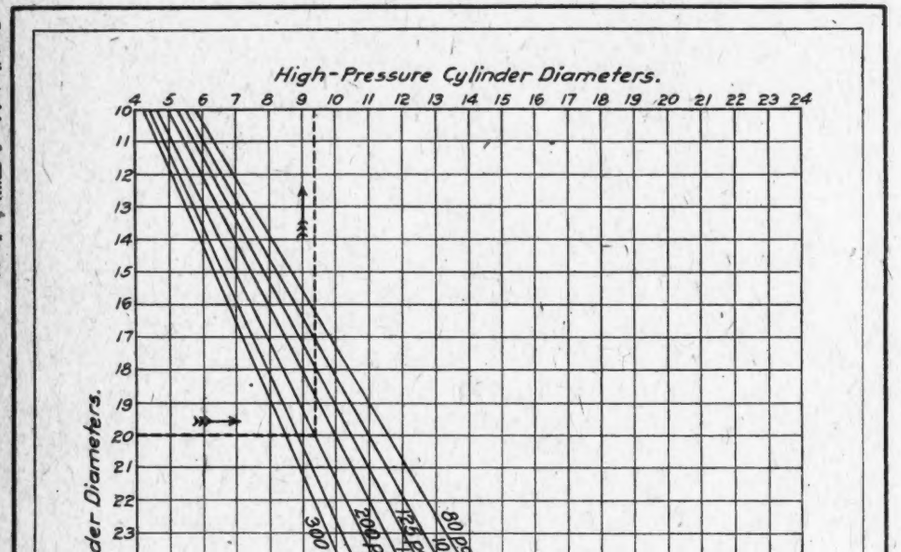
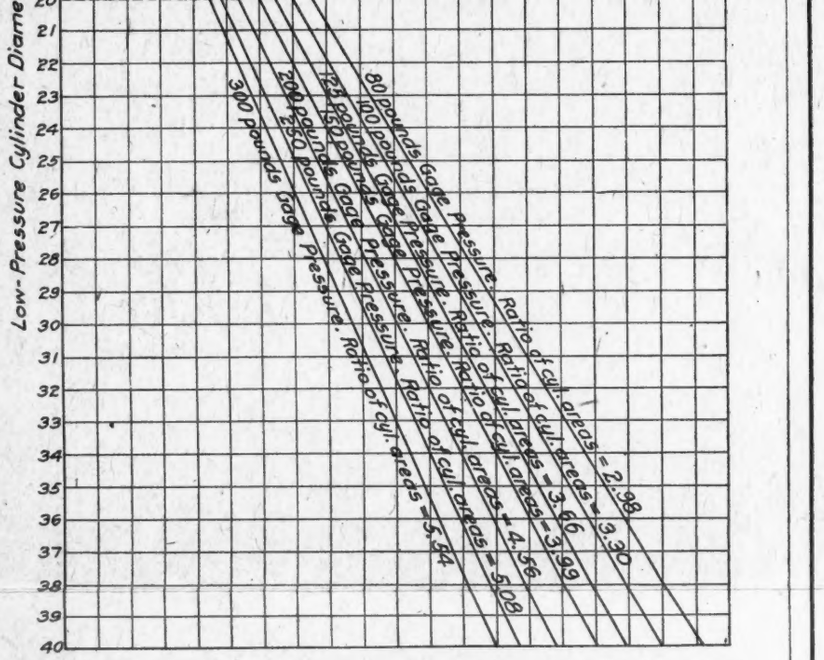
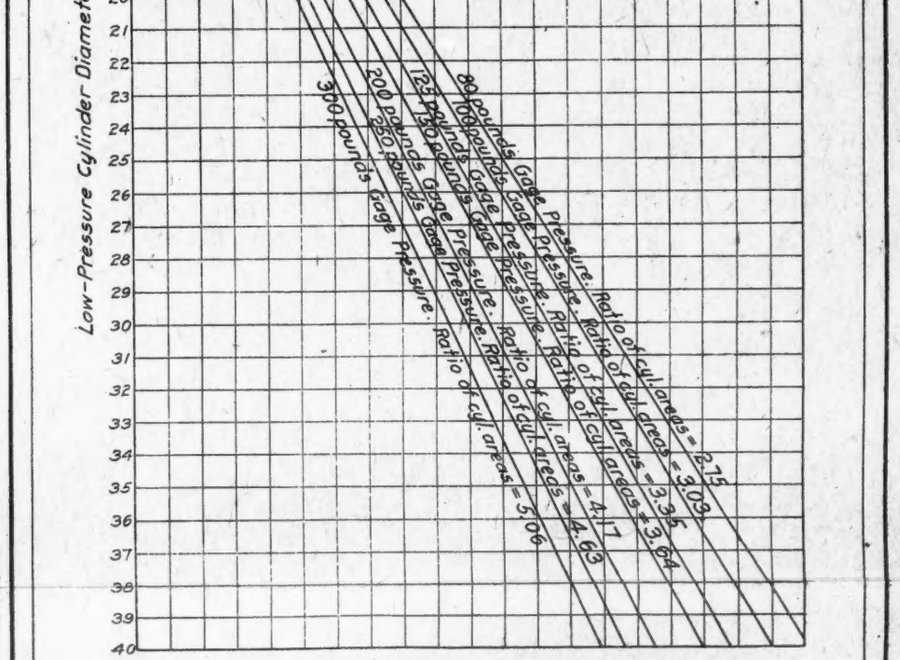




Compound Air Cylinders for 10,000 feet Altitude Compression.
Atmospheric pressure 10.07 pounds per square inch.



Compound Air Cylinders for 5,000 feet Altitude Compression.
Atmospheric pressure 12.2 pounds per square inch.